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"Welcome Shelter Near Trail's End"

↗ FEDERAL-STATE COOPERATIVE
SNOW SURVEYS AND IRRIGATION WATER FORECASTS

for

RIO GRANDE DRAINAGE BASIN

APRIL 1, 1947

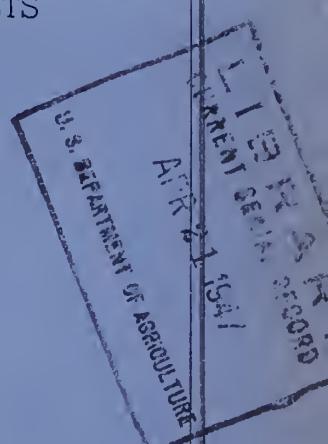
By

Division of Irrigation, Soil Conservation Service

United States Department of Agriculture

and

Colorado Agricultural Experiment Station



Data included in this report were obtained by the agencies named above in cooperation with the U. S. Forest Service, National Park Service, State Engineers of Colorado and New Mexico and other Federal, State and local organizations.

April 1, 1947
WATER SUPPLY OUTLOOK
RIO GRANDE AND CANADIAN DRAINAGE BASINS

The outlook for water supply in irrigated areas served by the Rio Grande and its tributaries is generally poor. During February and March, the increase in snow cover in the mountain areas has been below average, but the water content of the snow is now 45 percent above last year. Soil moisture in the valley areas is very deficient. Reservoir storage is low. In the mountain areas, north of Santa Fe, on the headwaters of the Pecos River, the snow cover continues to be very light. On the tributaries to the Canadian River the water stored in snow is considerably above last year, but below normal.

RIO GRANDE

Snow cover during the month of March in the mountains surrounding the San Luis Valley has increased a negligible amount and has decreased at medium and lower elevations. Water stored in snow in this area is now about 75 percent of average and 60 percent above last year at this time. The extreme deficiency is on the headwaters of the Conejos River where the summer discharge is expected to be about 65 percent of normal. Conditions are best on the Culebra river in the eastern part of the valley where the summer runoff is expected to be near normal. Precipitation in the San Luis Valley has been very deficient the past three months and soil moisture is low. Stream flow is normal. Reservoir storage is very low and amounts to less than 45 percent of the past 10-year average on April 1.

Similar snow conditions exist over the headwaters of the Rio Chama and other Rio Grande tributaries in northern New Mexico. At Cumbres Pass the snow water content is only 60 percent of normal. Valley precipitation in the northern and middle Rio Grande areas has been very deficient and soil moisture and crop conditions are reported as unfavorable. Storage in El Vado reservoir is now 41,000 acre-feet or less than 45 percent of April 1, 1946.

The combined storage in Elephant Butte and Caballo reservoirs is down to 775,000 acre-feet as compared to 1,277,000 last year at this time. During the past month soil moisture and crop conditions have improved due to above normal rainfall in the lower Rio Grande area in southern New Mexico.

Snow cover on the headwaters of the Pecos River, Tesuque and Santa Fe Creeks continues to be very light. Precipitation at lower elevations is below normal. The irrigation water supply derived from snow for these and adjacent streams will be light. Storage at Alamogordo, McMillan and Avalon reservoirs is 10 percent less than last year on April 1st.

CANADIAN RIVER

On the tributaries to the Canadian River the water stored in the snow is 50 percent above last year but only 75 percent of normal. Storage in Conchas Reservoir on the Tucumcari project is now 365,000 acre-feet as compared to 341,000 a year ago. Stream flow and precipitation has been low. Range and crop condition: are only fair.

RIO GRANDE RAINAGE BASIN

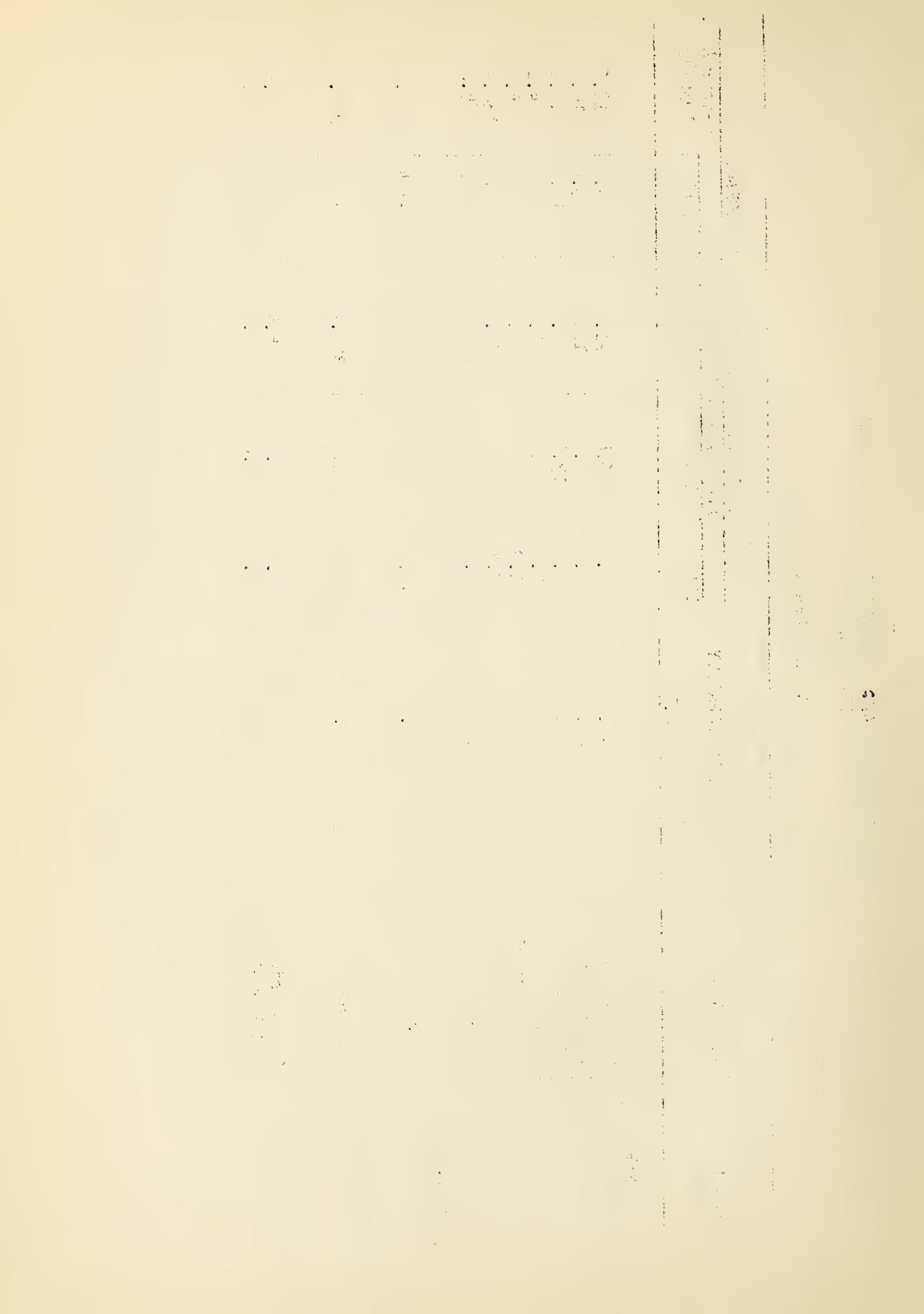
STREAM FLOW FORECASTS, April 1, 1947

Basin and Stream	April-September inclusive, Streamflow		Thousands Acre Feet	10-year avg. 1936-1945
	Forecast 1947	Measured 1946		
<u>RIO GRANDE</u>				
South Fork at South Fork	100,000		123,000	139,000
Rio Grande at Del Norte	425,000	347,000	467,000	555,000
Alamosa above Terrace Res.	60,000	50,000	77,000	101,000
Conejos at Mogote	150,000	124,600	221,000	233,000
Culebra at San Luis	35,000	16,000	39,000	45,000
Chama at Park View	170,000		267,000	262,000
Taos at Los Cordovas	60,000		42,000	48,000
Emband Creek at Dixon	37,000		68,000	72,000
Rio Grande at Otowi Fridge	775,000		1,046,000	1,017,000
Pecos at Pecos	35,000	69,000	66,000	73,000

SNOW SURVEYS AND IRRIGATION WATER FORECASTS
 RIO GRANDE BASIN

STATUS OF RESERVOIR STORAGE, APRIL 1, 1947

STREAM	RESERVOIR	USABLE CAPACITY 1000 A.F.	THOUSANDS OF ACRE FEET IN STORAGE				10-year Ave. 1936-45
			1947	1946	April 1 1945	1944	
RIO GRANDE	Rio Grande	45.8	6.9	6.4	21.4	9.8	18.6
	Santa Maria	45.0	5.5	7.5	11.8	5.6	10.1
	Sanchez	103.2	6.7	13.1	9.4	14.2	17.1
	Terrace	17.7	3.6	2.2	3.7	3.4	4.2
	Continental	26.7	1.2	7.6	17.7	7.8	6.3
	Elephant Butte	2273.7	512.3	1029.9	1223.9	1171.9	1138.9
	Caballo	365.0	262.8	247.9	281.0	259.3	165.2
	El Vado	226.0	41.0	95.6	98.6	43.4	65.9
	Conchas	600.0	364.9	341.5	346.9	393.3	221.6
	Alamogordo	148.0	35.6	40.0	45.4	21.6	64.6
	McMillan-Avalon	45.1	4.7	5.0	6.5	25.5	25.4
CHAMA RIVER							
CANADIAN RIVER							
PECOS RIVER							



SNOW SURVEYS AND IRRIGATION WATER FORECASTS
for

RIO GRANDE BASIN
April 1, 1947

SUMMARY OF APRIL 1 SNOW SURVEYS AND COMPARISON OF IATA WITH THAT OF PREVIOUS YEARS BY
WATERSHEWS

WATERSHEDS	Snow Depth			Water Content			Snow Density			1947 Water Content in percent of Elevan Year		
	Eleven Year		1946	1947		Eleven Year	1946		1947		1947	
	Avg.*	In.	In.	In.	Avg.*	In.	In.	Avg.	Percent	Percent	Avg.*	1946
Rio Grande	28.3	13.4	20.1	9.4	4.1	6.7	23	33	33	71	163	
South Fork	80.6	48.5	60.0	28.9	12.7	20.7	1	36	26	34	72	163
Upper Rio Grande	17.0	9.8	11.1	4.6	3.1	3.3	2	27	27	30	72	106
Alamosa River	42.7	27.5	35.0	12.6	6.8	10.7	2	29	25	31	85	158
Conejos River	45.9	22.4	28.6	16.2	6.2	9.7	2	35	28	34	60	156
Culebra River	34.3	16.8	35.8	10.5	4.4	10.8	1	31	26	30	133	246
Chama River	36.8	15.3	25.2	13.5	5.7	9.6	5	37	37	36	67	158
Rio Taos	18.6	8.5	17.7	6.7	3.2	9.0	1	36	38	51	134	282
Embudo Creek	27.9	17.9	20.7	8.8	6.0	6.3	2	32	34	30	72	105
Pecos River	11.6	4.9	2.0	3.7	1.5	0.6	3	32	31	30	16	40
Canadian River	24.1	10.4	18.3	7.7	4.1	5.5	3	32	39	30	72	134

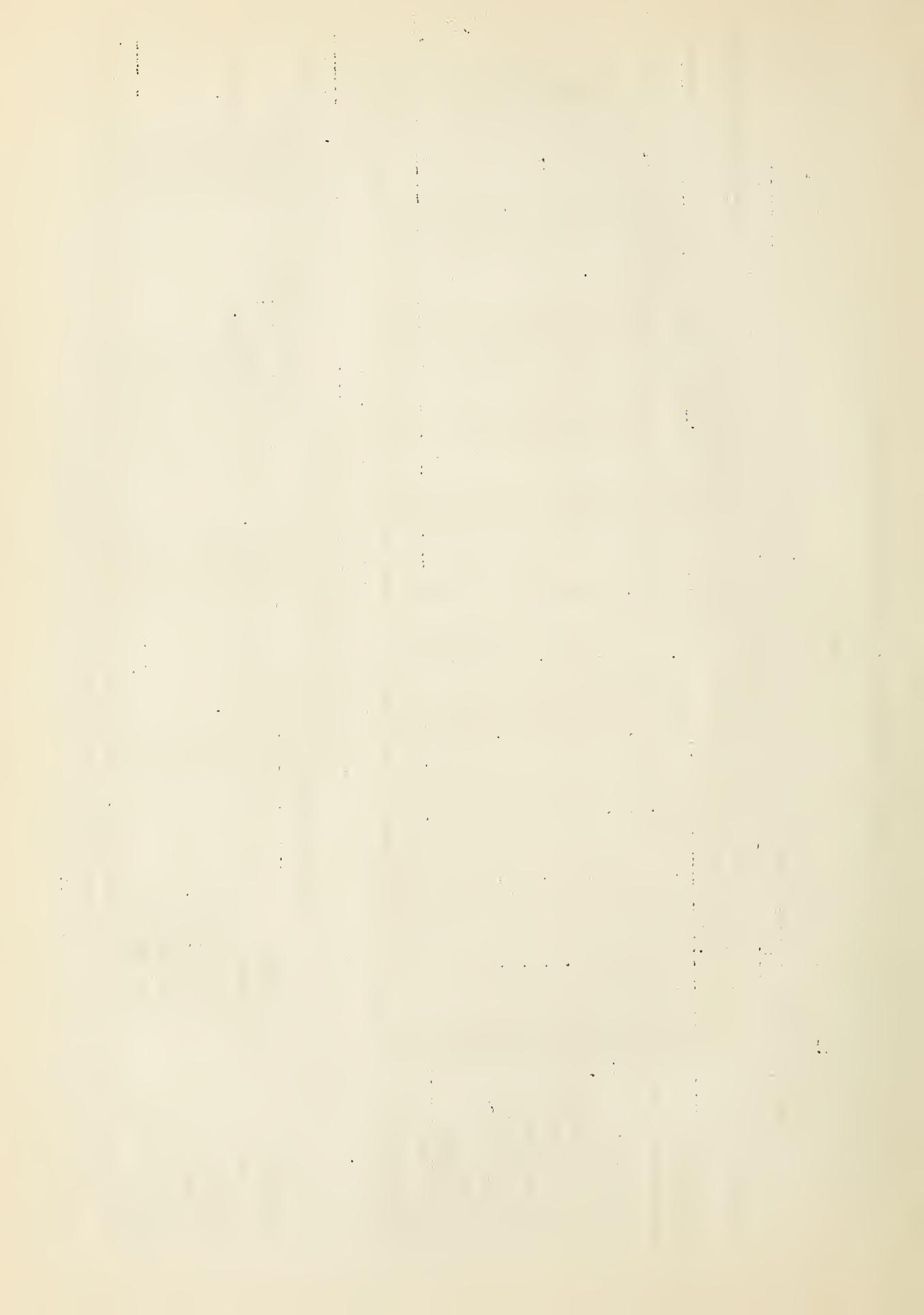
*Some for shorter periods

P R E C I P I T A T I O N D A T A

WATERSHED	STATE	Precipitation October 1 to March 31		Departure from Normal		Precipitation*	Departure from Normal
		Inches	Inches	Inches	Inches		
Canadian	New Mexico	4.38	+0.36	0.45	-0.31		
Rio Grande	Colorado	2.70	-0.78	0.19	-0.49		
Rio Grande (N)	New Mexico	5.66	-0.82	0.59	-0.65		
Rio Grande (S)	New Mexico	2.73	-1.03	0.27	-0.33		
Pecos	New Mexico	4.61	+0.19	0.50	-0.25		

Precipitation during March was below normal throughout the area. The accumulated precipitation since October 1 was below normal for all watersheds except the Pecos and Canadian.

*March precipitation tentative



RIO GRANDE DRAINAGE SNOW SURVEYS
April 1, 1947

April 1, 1947

DRAINAGE BASIN and SNOW COURSE	No. and State	LOCATION		Twp. or Lat.	Range or Long.	Elev.	Date of Survey (Inches)	Snow Depth RIO GRANDE	SNOW COVER MEASUREMENTS		Years of Record	Past Record Av. Water Content (Inche
		Sec.	Sec.						1946	1945		
Wolf Creek Pass	26 Colo.	4	37N	2E	10000	3/31	60.0	20.7	12.7	33.4	1.2	28.9
Upper Rio Grande	27 "	13	40N	4W	9350	3/31	15.5	4.7	6.2	5.4	1.2	5.5
Silver Lakes	47 "	15	36N	5W	9600	4/2	13.3	3.2	1.4	7.9	1.1	5.5
River Springs	49 "	25	33N	6W	9300	4/1	15.6	4.2	1.6	10.2	1.1	6.9
LaVeta Pass #2	74 "	22	28S	7W	9300	4/1	25.2	8.2	4.9	11.4	1.2	7.8
Summitville	76 "	30	37N	4W	11500	3/31	56.6	18.2	12.2	21.3	9	19.8
Cumbres Pass #2	77 "	17	32N	5W	10000	3/31	41.5	15.2	10.7	29.4	12	25.6
Santa Maria	80 "	8	41N	2W	9700	4/1	6.7	2.0	0.0	3.4	9	3.7
Culebra	82 "	37.2N	105.2W	10000	4/1	35.8	10.8	4.4	12.7	8	8	10.5
Fort Garland	84 "	13	29N	72W	8200	4/1	0.0	0.0	0.0	3.7	3.0	3.0
Red River	1 N.Mex.	29	28N	15E	9500	3/31	19.9	6.3	1.3	16.0	1.1	8.7
Taos Canyon	2 "	10	25N	15E	9000	3/31	17.7	9.0	3.2	12.4	1.1	6.7
Aspen Grove	4 "	12	18N	10E	9100	3/31	2.6	0.7	1.4	7.3	1.1	3.5
Lee Ranch	5 "	3	18N	4E	9050	4/1	8.7	2.6	1.2	9.7	1.1	7.4
Canjilon	6 "	4	26W	6E	9500	3/29	47.9	20.1	12.1	26.5	1.1	22.6
Hamptite Park*	9 "	8	28N	15E	9500	4/1	13.3	3.9	0.3	10.8	1.1	5.4
Tres Ritos	12 "	23	22N	13E	9000	4/11	10.2	3.3	2.1	9.5	1.0	5.1
Pay Role	15 "	16	28N	7E	9700	3/28	22.1	5.4	3.5	11.2	8	8.7
Jicarilla	16 "	9	29N	1W	8500	0	0	0.0	0.0	2.3	8	2.5
Chama Divide	17 "	36.9N	106.7W	7750	3/30	0.0	0.0	0.0	0.0	5.3	6	8.0
Chamita	18 "	36.9N	106.7W	8500	3/30	14.3	4.2	2.0	11.4	6	6	12.6
Corcova	19 "	22	22N	13E	10100	3/31	31.3	9.3	10.0	3.0	0.0	2.0
Panchuela #2	20 "	27	19N	12E	8300	4/1	1.0	0.3	0.0	0.0	1.1	5.7
Big Tesuque	21 "	17	18N	11E	10000	3/29	2.5	0.7	3.1	10.2	6	12.6
										6.7		9.4

*On adjacent drainage

RIO GRANDE DRAINAGE SNOW SURVEYS
April 1 1947

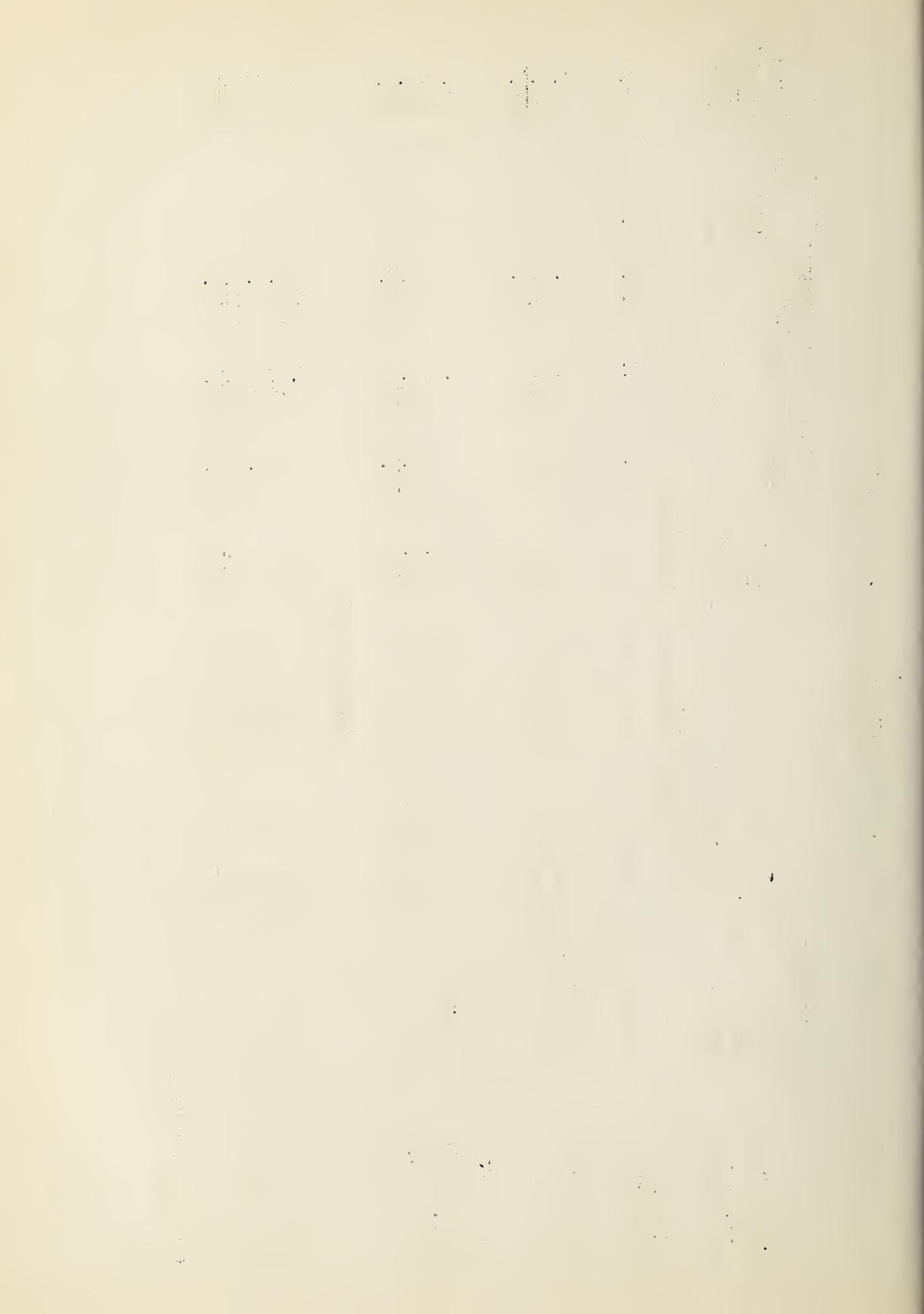
DRAINAGE BASIN and SNOW COURSE	No. and State	Twp. Sec. or Lat.	Range or Long.	Elev.	Date of Survey (Inches)	Snow Depth (Inches)	SNOW COVER MEASUREMENTS		Past Record	Av. water content (Inches)
							1946	1945	Years of Record	
RIO GRANDE TRIBUTARIES IN SAN LUIS VALLEY										
UPPER RIO GRANDE	27 Colo.	13	40N 41N	4W 2W	9350 9700	3/31 4/1	15.5 6.7 11.1	4.7 2.0 3.3	6.2 0.0 3.1	5.5 3.7 4.6
Upper Rio Grande	"	8	Average for drainage							
SANTA MARIA	80									
SOUTH FORK RIO GRANDE	26 Colo.	4	37N	2E	10000	3/31	60.0	20.7	12.7	33.4
Wold Creek Pass										
ALAMOSA RIVER	47 Colo.	15	36N 37N	2E 4E	9600 11500	4/2 3/31	13.3 56.6 35.0	3.2 18.2 10.7	1.4 12.2 6.8	7.9 21.3 14.6
Silver Lakes	"	30								
Summitville	76									
CONEJOS RIVER	49 Colo.	25	33N 32N	6E 5E	9300 10000	4/1 3/31	15.6 41.5 28.6	4.2 15.2 9.7	1.6 10.7 6.2	10.2 29.4 19.8
River Springs	"	17								
Cumbres Pass*	#2									
CULEBRA RIVER	82 Colo.		37.2N	105.2W	10000	4/1	35.8	10.8	4.4	12.7
Culebra										
CHAMA RIVER	77 Colo.	17	32N	2E	10000	3/31	41.5	15.2	10.7	29.4
Cumbres Pass #2	"	4	26N	3E	9500	3/29	47.9	20.1	12.1	26.5
Canjilon	"	16	28N	7E	9700	3/28	22.1	5.4	3.5	11.2
Pay Role	"	9	29N	1W	8500		0	0	0	8.7
Jicarilla	"	16	36.9N	106.7W	7750	3/30	0.0	0.0	2.3	2.3
Chama Divide	"	17	36.9N	106.7W	8500	3/30	14.3	4.2	5.3	5.3
Chemita	"	18	Average for drainage						2.0	6

*On adjacent drainage

RIO GRANDE DRAINAGE SNOW SURVEYS
April 1, 1947

DRAINAGE BASIN and SNOW COURSE	No. and State	LOCATION			SNOW COVER MEASUREMENTS			Years or Record	Past Record
		Sec. or Lat.	Typ. Range or Lat.	Elev.	Date of Survey	Snow Depth (Inches)	Water Content (Inches)		
RIO GRANDE TRIBUTARIES IN NEW MEXICO									
RIO TAOS Taos Canyon	2 N.Mex.	10	25N	15E	9000	3/31	17.7	9.0	6.7
EMBUDO CREEK Tres Ritos Cordova	12 N.Mex. " " 22	23 22	22N 22N	13E 13E	9000 10100	4/1 3/31	10.2 31.3 26.7	3.3 9.3 6.3	5.1 12.6 8.8
PECOS RIVER Aspen Grove* Panchuela $\frac{1}{2}$ Big Tesuque*	4 N.Mex. 20 " 21 "	12 27 17	18N 19N 18N	10E 12E 11E	9100 8300 10000	3/31 4/1 3/29	2.6 1.0 2.5 2.0	0.7 0.3 0.6 0.6	3.5 2.0 5.7 3.7
CANADIAN RIVER									
Hematite Park Ocate Mesa Tres Ritos* Cordova*	9 N.Mex. 10 " 12 " 19 "	8 25 23 22	28N 24N 22N 22N	15E 16E 13E 13E	9500 9200 9000 10100	4/1 4/1 4/1 3/31	13.3 10.2 31.3 18.3	3.9 3.3 9.3 5.5	5.4 3.2 5.1 12.6 7.7

*On adjacent drainage



The following organizations cooperate in the snow surveys and irrigation water supply forecasts for the Colorado, Missouri-Arkansas and Rio Grande watersheds by furnishing funds or services.

STATE

Colorado State Engineer
Wyoming State Engineer
Utah State Engineer
New Mexico State Engineer
Montana State Engineer
Nebraska State Engineer
Colorado Experiment Station
Colorado Extension Service
Montana Experiment Station
Utah Experiment Station

FEDERAL

Department of Agriculture
Forest Service
Soil Conservation Service
Department of Interior
Bureau of Reclamation
Indian Service
Geological Survey
National Park Service
Department of Commerce
Weather Bureau
War Department
Army Engineer Corps

PUBLIC UTILITIES

Colorado Public Service Company
Western Colorado Power Company
Montana Power Company
Denver and Rio Grande Western R. R. Company

MUNICIPALITIES

City of Bozeman
City of Denver
City of Boulder

WATER USERS ORGANIZATIONS

Poudre Valley Water Users' Association
Arkansas Valley Ditch Association
Colorado River Water Conservation District

IRRIGATION PROJECTS

Farmers Reservoir and Irrigation Company
San Luis Valley Irrigation District
Santa Maria Reservoir Company
Costilla Land Company
Uncompahgre Valley Water Users' Association
Wyoming Development Company
Goshen Irrigation District
Kendrick Project
Pathfinder Irrigation District
Salt River Valley Water Users' Association
San Carlos Irrigation and Drainage District
Twin Lakes Reservoir and Canal Company

Many other organizations and individuals furnish valuable information for the snow survey reports. Their cooperation is gratefully acknowledged.

